EEScience

Guest Editorial

The Atmospheric Radiation and Measurement (ARM) Program's Education and Outreach Program

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History

The Atmospheric Radiation and Measurement (ARM) Program's Education and Outreach activities promote basic science education and community awareness of the environment with an emphasis on global climate change. A major focus of ARM Education and Outreach is enrichment of curricula for regional and local schools near each of the ARM field sites. The ARM Program has primary field sites in the Southern Great Plains, Tropical Western Pacific, and North Slope of Alaska. Collaboration between scientists, teachers, students, and community is key. For more information about the program, visit http://www.arm.gov/docs/education.html.

In 1997, the Atmospheric Radiation Measurement (ARM) Program (U.S. Department of Energy) implemented the North Slope of Alaska (NSA) site to provide data about cloud and radiative processes at high latitudes, and in cold environments. It is widely believed that the Polar Regions will be more affected by climate changes associated with global warming than other areas of the earth. The ARM Program objectives for its NSA research are focused on improving our understanding of high latitude cloud and radiation processes and their representation in global climate models. The two ARM sites on the North Slope of Alaska are located in Barrow and Atqasuk, small villages on the edge of the Arctic Ocean.

An important goal for ARM Education and Outreach is to integrate traditional knowledge into science education curricula for students, educators, and the community at each of the ARM site locations. Schools in the

United States do not typically incorporate traditional knowledge into curriculum; however, many indigenous communities now realize the importance of culture, tradition, and elder knowledge in educating their youth. In 2003, ARM Education and Outreach installed and dedicated an interactive kiosk, Climate Change: Science and Traditional Knowledge, for the community of Barrow, Alaska. The kiosk features interviews about climate change with educators, subsistence

hunters, and elders from the Barrow community accompanied by interviews with anthropologists, ARM researchers, and other scientists. These perspectives offer a diverse look at climate change. In collaboration with Yaza Design (Chicago, IL), the Iñupiat Heritage Center (Barrow, AK), and the Barrow Arctic Science Consortium (Barrow, AK), ARM Education and Outreach created the kiosk as an educational tool for students, the community, and visitors.

Iñupiaq people have inhabited the North Slope of Alaska for more than 10, 000 years and have observed environmental changes, many of them associated with global warming, rising sea temperatures, and sea ice and permafrost melt. On the coast of the Arctic Ocean in Alaska, coastal erosion is a prominent problem because most of the shoreline consists of permafrost covered by tundra. Normally, permafrost melts only at the surface during the summer and then refreezes in the winter. Now, due to global warming, the seasonal melt is occurring deeper in the permafrost and lasting longer into the fall. With sea ice forming later in the season, fall storms occur over open water, and waves break upon melted permafrost when they reach the Arctic shore. Furthermore, global warming is causing sea level to rise. Shorelines of melted permafrost don't stand a chance against higher sea level and big waves, and neither do the communities built on permafrost foundation. Important issues like coastal erosion, thinning sea ice, and rising sea level are discussed in the kiosk interviews.

The kiosk initiative started in 2001 when the ARM Education and Outreach team met with North Slope community members to assess the needs of teachers, students, and the community with respect to science education. We learned that traditional Iñupiaq activities are being affected by climate change, and the community requested that we assist them with an improved exhibit on climate change for the museum in the center of town, the Iñupiat Heritage Center (IHC). We worked with the IHC to define the scope of the project, and then contracted with Yaza Design for the interviews and overall software design. ARM Education and Outreach staff in EES-2 participated in conducting the interviews and took the lead in reviewing many drafts with the community, IHC, ARM, and other museums. One interview on the kiosk features a whaling captain, speaking about the thinning of the sea ice and how this makes the spring whale hunt more difficult and dangerous for hunters. In another interview, an elder woman (Photo 1) speaks about how the tundra freezes later and later each year, which determines when people can put down their nets through the ice.

Photo 1: Elder Woman speaking about Tundra

The kiosk demonstrates how traditional knowledge of the environment is key to understanding climatic issues. Users have an option of listening to the kiosk in English or Iñupiaq, the native language of the Iñupiaq people (Photo 2).

Photo 2: Children using the kiosk

A well-attended dedication ceremony was held at the Iñupiat Heritage Center IHC on October 9, 2003 to acknowledge the completion and installation of the kiosk. The invocation was given in Iñupiaq by elder Noah Itta, followed by speeches from Reanne Tupaaq Crist, deputy director of the IHC;
Dr. Michael Ebinger, ARM Education director; Dr. Wanda Ferrell, DOE ARM program director; Dr. Doug Sisterson, ARM Operations director; Dr. Bernie Zak, NSA site director; Jana Harcharek, North Slope educator; and Jeff Berger of Yaza Design, the kiosk producer. A demonstration of the kiosk followed the speeches, and the ceremony ended with a traditional dance by the Nuvukmuit Eskimo dancers (Photo 3).

Michael Ebinger, Margo Bachman, Tina Sommer, Carrie Talus (all EES-2), and Marja Springer (EES-6) attended the dedication ceremony. In addition to the kiosk events, the team was invited by the community to join seasonal activities such as celebrating the successful catch of the first whale of the season. All of the team had the opportunity to sample
the North Slope delicacy of *muktuk*, fresh whale skin and blubber.

Photo 3: Nuvukmuit Eskimo dancer

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